## Conference Goal:

**To identify the investigations and sequence of missions that will provide the most direct, unambiguous, and cost-effective approach to assessing the three-dimensional distribution and state of $H_2O$ in the Martian crust (at an ultimate resolution sufficient to access the highest priority targets by drilling).**

## Discussion Questions:

**Monday:**

1. **What key issues motivate the search for water on Mars?**

2. **What environmental conditions, crustal properties, and physical processes affect the distribution and state of subsurface water in cold climate regions on Earth? How are differences in these parameters likely to influence the distribution and state of water on Mars?**

3. **What are the highest priority $H_2O$ targets? And to what desired depth and spatial resolution must their location be determined?**

4. **To what extent is crustal heterogeneity likely to limit theoretical and geomorphic attempts to assess the distribution and state of subsurface water?**

5. **What other volatiles (besides $H_2O$) are likely to be present in the subsurface? And how might their presence complicate the identification of subsurface water?**

**Tuesday:**

1. **What geophysical techniques have been most effective in assessing the distribution of ground ice, groundwater, and the internal structure of glaciers and ice sheets on Earth?**

2. **Does the application of 3-D data acquisition and visualization techniques offer any significant advantages, over more traditional 1- and 2-D methods, in understanding the nature of the subsurface, and identifying potential volatile targets, on Mars?**

3. **What insights into these issues are likely to be provided by the orbital radar sounding investigations aboard Mars Express and the Mars Reconnaissance Orbiter?**

**Wednesday:**

1. **What are the diagnostic limitations and potential environmental complications associated with the interpretation of geophysical sounding data? What additional tests or techniques might be employed to reduce the level of uncertainty?**

2. **Is the potential science return that might be realized from an optimized orbital radar sounding investigation (vs. that anticipate from Mars Express and MRO) sufficient to warrant the flight of a dedicated "mapping" mission? And is such a mission a necessary precursor to the effective targeting of landed investigations?**

3. **Are there other types of subsurface global reconnaissance investigations that can be conducted from**

**orbit?**

4. **How does the distribution and state of water within the km-thick permafrost of Siberia compare with our expectations for Mars? Can the discrepancies that exist be reasonably attributed to the evolutionary and environmental differences between the two planets? Or do they reflect more fundamental problems in our understanding of the processes and conditions that have affected the distribution of water on Mars?**

## Thursday:

1. **What do we expect to learn about the nature of the Martian subsurface from the seismic and electromagnetic investigations conducted by NetLander?**

2. **What specific geophysical investigations (or combination of investigations) provide the highest level of confidence in the identification of subsurface $H_2O$? And can they do so with sufficient spatial resolution to guide the placement of a drill?**

3. **What is the minimum number of geophysical stations (and optimal station payload) necessary to construct a global network capable of conducting both regional-scale investigations of the volatile characteristics of the crust and moderate-resolution (~10 $km^2$) corroborative investigations of the most promising potential volatile targets identified by orbital radar sounding? What is the most effective way in which such a network might be deployed?**

4. **Are there other platform options that offer an equal or greater capability (vs. high-density surface networks) to perform moderate- to high-resolution pre-drilling surveys?**

5. **What additional knowledge are we likely to gain from the geophysical exploration for subsurface water on Mars?**

## Friday:

1. **What are some of the techniques that might be employed to access, analyze and potentially sample (for retrieval back to the surface) targets of interest at depths ranging from ~10 - $10^3$ meters? What type of data might such drilling investigations acquire (or down-hole experiments might they conduct) that would improve our ability to interpret the various geophysical data sets we are likely to have in hand?**

2. **What investigations and sequence of missions represent the most direct, unambiguous, and cost-effective approach to assessing the three-dimensional distribution and state of water in the Martian crust?**

3. **Given the inherent ambiguity in identifying high priority subsurface targets (such as liquid water or the frozen relic of a former ocean) by geophysical means, how "good" must our confidence in such an interpretation be before it is sufficient to select a site for a dedicated landed investigation (e.g., deep drilling, sample return, etc.)? What standard or procedure should be used to assess this level of confidence?**